A New Guidebook for Managing Small Airports and What to Consider With Corporate Aircraft Operations

So Someone Wants to Build a Corporate Aircraft Hangar at Your Airport...What You Need to Know

Purdue Road School

Wednesday, March 07, 2018

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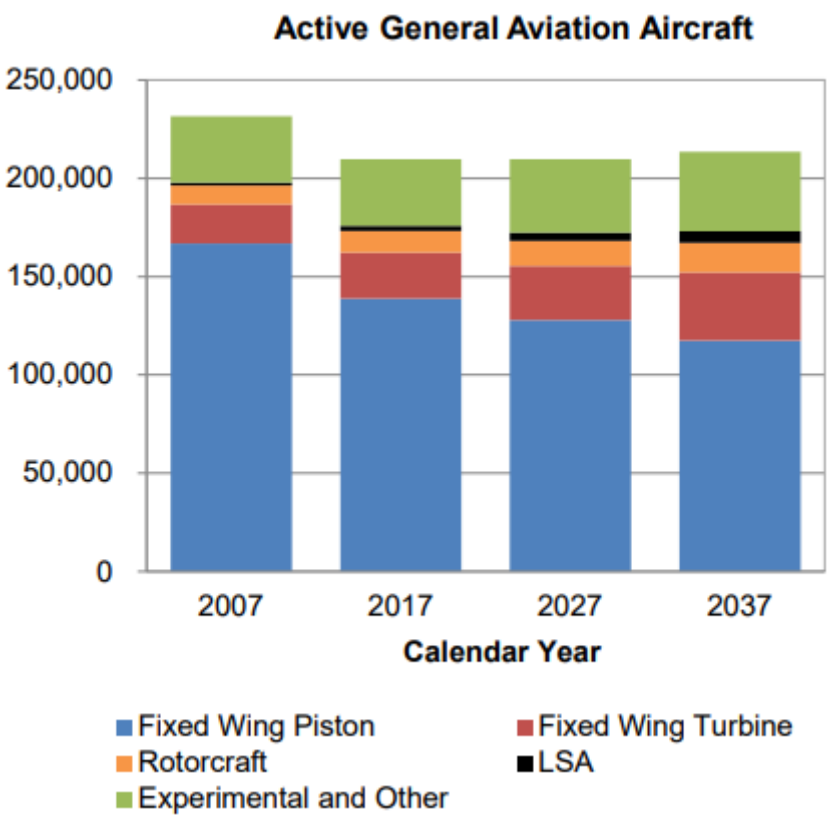
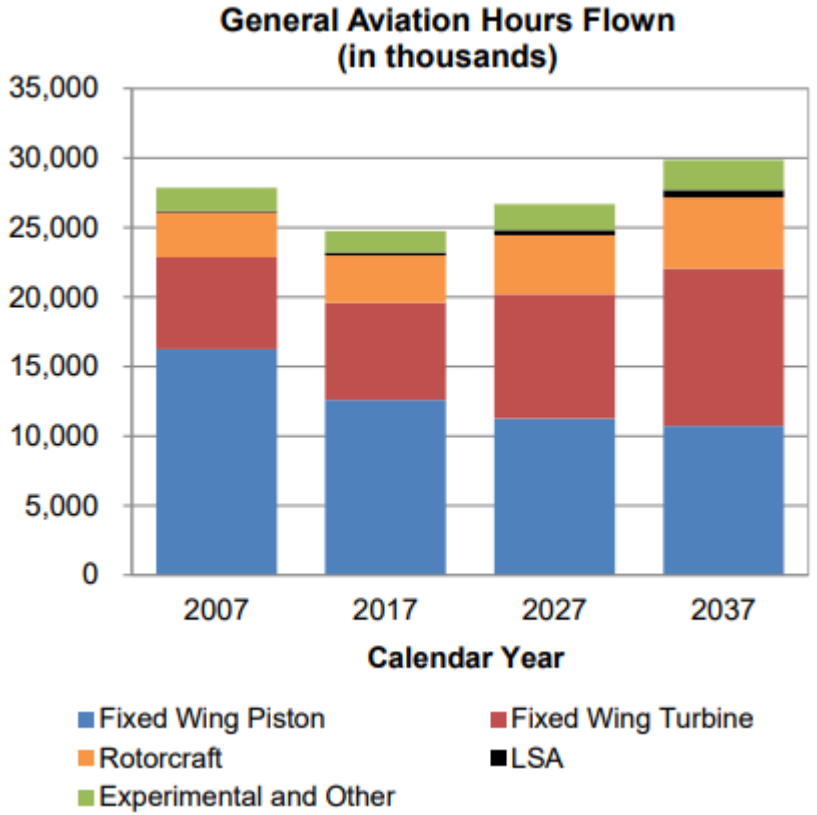
Why the New Interest in Hangars? Corporate Traffic Growth and Forecast





FAA Aerospace Forecast, Fiscal Years 2017-2037

Aircraft Hangars - Types

- We will not be talking about T-Hangars
- We will be talking… “Conventional Hangars”
- These are more commonly described as:
  - Storage: Aircraft Parking out of the Elements Only
  - Maintenance: Storage and Aircraft Maintenance
  - **Corporate: Storage and Offices**
  - Executive Hangar: Single Large Structure with Multiple Units
  - Greater than 3,600 sq. ft. (60 ft. by 60 ft.)

RWN – 80 ft. x 60 ft.
Maintenance Hangar

FKR – 100 ft. x 110 ft.
Corporate and
Maintenance Hangar

TYQ – 162 ft. x 122 ft.
Corporate and
Maintenance
“Repair” Hangar

Aircraft Hangars – New Trends

- Executive Hangars or “Box Hangars”
- Considered Large T-Hangar or Multi-Corporate Hangar Units
- Designed for Larger Piston, Smaller Jets
- “Spec” Building

BAK – 6 Units, 62 ft. x 65 ft. with 18 ft. Door Clearance New Aircraft Hangar

Airport Hangar Development Planning – DO'S

- Identify Qualified, Best Use Hangar Location Options on Airport Layout Plan
- Know your Zoning-Permit-Environmental Requirements
- Involve Your Tenant/Pilot Community in the Decision Making
- Establish Business Case with Financial Analysis and Airport Performa
- Prepare Lease/Build Agreements
- Be Ready, Flexible for Anything but don't Sign Up for Everything

LAF – Multi-Size/Use Hangars in Flexible Build Out Locations on ALP

Airport Hangar Development Planning – DON'TS

- Promote "Site Ready" that is NOT "Site Ready"
- Start Design/Construction without sufficient Funds
- Over/Under Estimate Your Potential Income/Costs – Be Honest
- Interfere with Long-Term Planning (e.g. Approaches) for Short Term Gains
- Demolish if it can be Refurbished

HUF – 100 ft. x 60 ft. Hangar Re-Modernization in Lieu of Demolition

Hangar Facility Planning – First Steps

- Know your Funding Sources and Funding Amount *with Contingency:*
  - FAA/State AIP grants
  - Airport Cumulative/General Development Funds
  - Economic Development Corporations (Community Funds)
  - Municipal/County Bond
  - Bank Loan
  - Private-Public-Partnerships (P3'S)
- To start Budgeting the "PROJECT" for Funding, Plan Approximately for:
  - Basic Storage Hangar: (5,000 to 6,000 sq. ft.) — $750 to $1M in Funds
  - Corporate/Executive Hangar(s): (10,000 to 11,000 sq. ft.) — $1M to $2M in Funds
  - Corporate/Maintenance Hangar: (Over 12,000 sq. ft.) — +$2M in Funds

Hangar Facility Planning – First Steps

Approximate Metal Hangar Building Group/Costs with Amenities (Site Not Included)

- 60 ft. x 60 ft. Units (5 Minimum)
- 18-20 ft. Tail Clearance
- $175,000-$250,000 per Unit

- 75 ft. x 75 ft.
- 5,000 - 6,000 ft.
- 20-22 ft. Tail Clearance
- No Built Out Space
- $70-110 per sq. ft.
- $450,000 - $660,000

- 100 ft. x 100 ft.
- 10,000 – 11,000 sq. ft.
- 22-28 ft. Tail Clearance
- Utilities/Bathrooms/Offices
- $80-200 per sq. ft.
- $800,000 - $2.2M

- 150 ft. x 150 ft.
- 20,000 – 25,000 sq. ft.
- ≥ 28 ft. Tail Clearance
- Office/Meeting Space
- Kitchen/Shop Space
- Sleeping Space
- Multi-Purpose Space
- Covered Entry Drive
- Fire Protection System
- $200-400 per sq. ft.
- $4M - $8M

Hangar Facility Planning – First Steps

- Once you are a go… Decide Procurement Method
  - Design-Bid-Build
  - Design-Build
  - Private Partnerships
- Identify Stakeholders and Team Members
- Conduct a Stakeholder/Team Design Charette (Intensive Planning Review) – A MUST
  - Airport Owner Staff
  - Users/Tenants Staff
  - Lead Architect
  - Lead Engineer(s)
  - Maintenance Staff
  - Contractor(s) (Optional)
  - Local Permitting Agencies (Optional)
  - FAA/INDOT (Optional)

Hangar Facility Planning – First Steps

- Know the Five Basic Types of Spaces in a Hangar
  - Hangar Area
  - Building Utilities Area
  - Office/Administration and Specialty Areas (Bathrooms)
  - Shops Area
  - Warehouse/Storage Area

Hangar Facility Planning – First Steps

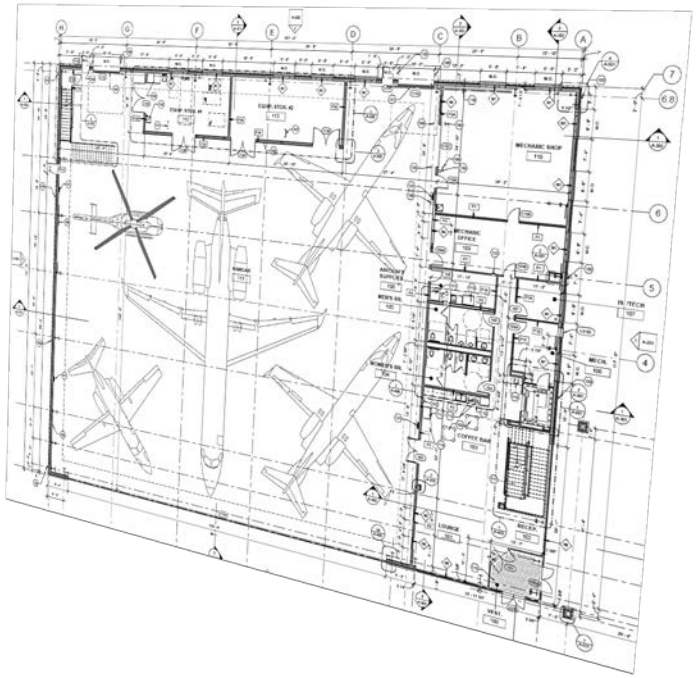
- Know what you need and want to what you can afford… there is a difference!

Want

Afford

Hangar Facility Planning – First Steps

- Conduct Careful Analysis in the Charrette:
  1. **Get Consensus on Business Case, Type of Hangar, Benefits** (Vision)
  2. **Establish the Budget and Schedule with Contingency**
  3. **ID Type of Aircraft(s)** to be in the Hangar
  4. **ID Functions** to be Performed or Not
  5. **ID Special Purpose Items or Needs** (e.g. Bathrooms, Cooking Areas, Lobbies)
  6. **Estimate Size of Each Space**
  7. **Define Critical Systems and Needs**
     1. Design Requirements (e.g. Sustainability/LEED)
     2. Building Types and Openings
     3. Hangar Door: Sliding, Vertical Lift, Bi-Folding
     4. Security and Communications
     5. Mechanical Electrical Plumbing (MEP) Systems
     6. Interior Building Materials and Types
     7. Site/Civil Improvements



Hangar Facility Planning – First Steps (Check Your Size/Use/Group)

- The International Building Code (IBC) and the National Fire Protection Agency (NFPA) determine if HANGAR FIRE SUPPRESSION (FOAM/WATER) IS REQUIRED.
- This can be a significant cost, design changer.
- There are 2 Types of Occupancy Uses
  - **S-1 Occupancy:** Aircraft "Repair" Hangar (Moderate-Hazard Storage, Maintenance)
  - **S-2 Occupancy:** Aircraft "Storage" Hangar (Low-Hazard Storage)
- With 4 Building Types (**Groups I through IV**)
- If you have:
  - S-1 Hangar > 12,000 sq. ft.; and/or a
  - Group I hangar door > 28 ft. in height,
  - A FIRE SUPPRESSION SYSTEM IS REQUIRED and no variances are permitted.
- Maintenance does not always mean Fire Suppression. Professional advice is recommended for applicability review of the regulations.

Hangar Facility Planning – First Steps

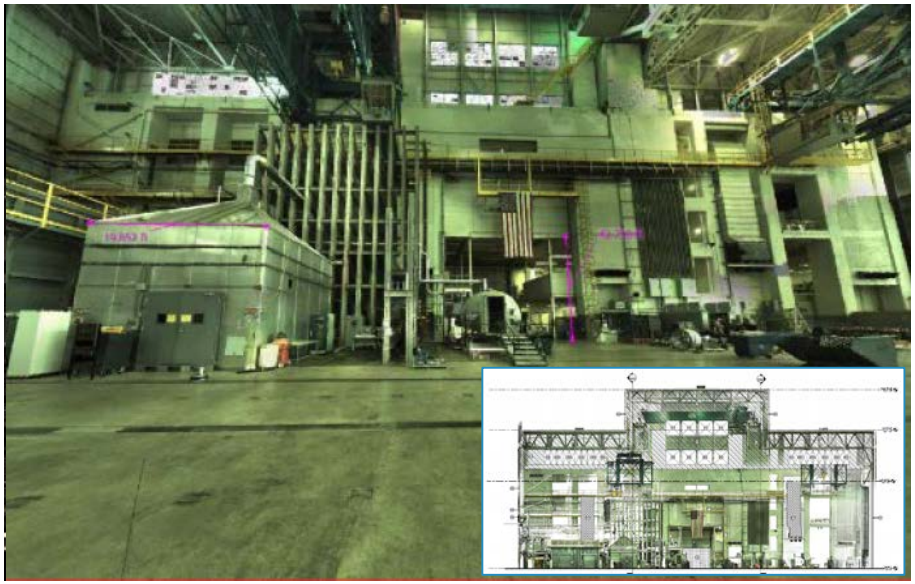
- Know the Costs and the Cost Differences Makers:
  1. **Pre-Engineered Building Costs –**
     (Most Commonly Underestimated, Most Expensive Single Cost Item)
  2. **Hangar Door Costs –**
     (Most Commonly Oversized Item and Costly Maintenance Issue)
  3. **Facility Building Improvement Costs –**
     (Most Commonly Owner Over Estimated as Required Item)
  4. **Site Development Costs –**
     (Most Variable, Required Work Items)
  5. **Bid Environment and Geography**
     - Union vs. Non-Union
     - Skilled General Contractors Availability
     - Specialty Work (Hauling or Build-on-site)
     - Bid Method (Design Build vs. Design-Bid-Build)
     - Material Pricing (Steel and Concrete are the Variable Killers)

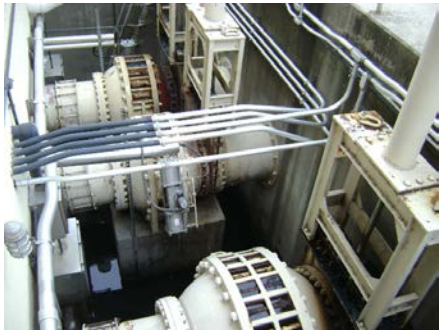
Hangar Design/Bidding/Construction

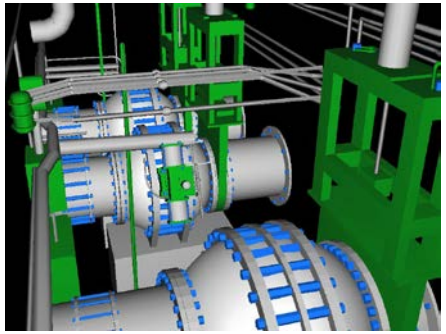
- Tips when building a Hangar Facility:
  - **Plan on Last Minute Problems**
  - **Conduct Design/Costs Reviews** with Stakeholders at 60%, 90% and Final
  - **Review/Update Liability/Risk Insurance**
  - **Look for Bid Options** to Reduce Costs or Build at Later Date
    - Offices, Entrances and Building Extensions
    - MEP Systems and Equipment
  - **Push for Competitive Bidding**
    - Pre-Quality Local Bidders
    - Flex on Schedule (Low Damages), Materials (Approved Equals)
  - **Don't Underestimate Airfield Operations Impacts/Constructability**
    - Runway Closures (Cranes) and Taxiway Closures (Construction Activity)
  - **Conduct Construction Inspection, Testing**
  - **Conduct a Detailed Final Walkthrough** with Permitting Agencies

Consider (Newer) Design Technologies

- Virtual Reality (VR) Design Reviews
- (LiDAR) Scan to CAD/GIS/BIM/Revit







Questions & Answers

Handouts Available:

ACRP – GA Facility Planning

AOPA – Aircraft Hangar Development Guide

Woolpert - GA Aircraft Characteristics List (Height/Width/Length) for Hangar Fit